

L. L. NARAYANA* & Digamber RAO*: **Contributions
to the floral anatomy of Linaceae 6****

L. L. ナラヤナ*・D. ラオ*: アマ科の花部解剖学的研究 6

The earlier published reports on the floral anatomy of the family were those by Narayana (1964); Narayana and Rao (1966, 1969, 1971, 1973, 1974a, 1974b). The present contribution, the sixth in the series deals with the floral morphology and vascular anatomy of four species of *Linum*, viz., *L. flavum* Linn., *L. lewisii* Pursh., *L. perenne* Linn., and *L. usitatissimum* Linn.

Morphology of the flower The flower is pedicellate pentacyclic, pentamerous, heterochlamydeous, regular, bisexual and hypogynous (Figs. 1, 8-11, 14, 15, 23, 24, 28, 33, 39, 46, 47). The quincuncial sepals are free (Figs. 7, 8, 32, 45) except in *L. lewisii* where they are basally connate (Fig. 20). The polypetalous corolla shows contorted aestivation (Figs. 9-11, 14, 23, 24; 32-35, 39, 47). The monadelphous androecium consists of five fertile stamens with as many non-vascularised staminodes alternating with them (Figs. 9-11, 23, 34, 35, 46, 47). Staminodes are absent in *L. lewisii* (Fig. 24). In *L. perenne* two of the five stamens show the presence of glands at the base (Figs. 28, 32). The gynoecium is 5-carpellary, syncarpous (Figs. 11, 24-27, 35-37, 46, 47), with ten loculi at the base due to the development of false septum from the mid-region of the ovary wall (Figs. 24, 25, 35, 46). The septum recedes at a higher level when the ovary becomes five locular (Figs. 11, 12, 26, 36, 37, 47). There are two pendulous anatropous, bitegmatic ovules in each loculus (Figs. 1, 11, 15, 26, 28, 37, 46, 47). The ovary becomes unilocular towards the top (Figs. 13, 38); styles are free in *Linum flavum* and *L. usitatissimum* and each shows a ventral groove lined by glandular cells (Figs. 1, 14). In *L. perenne* there is basal connation of the styles (Fig. 39) while in *L. lewisii* the union extends to nearly half the length of the style (Fig. 15). The stigmatic lobes are covered by glandular hairs (Figs. 1, 15, 28).

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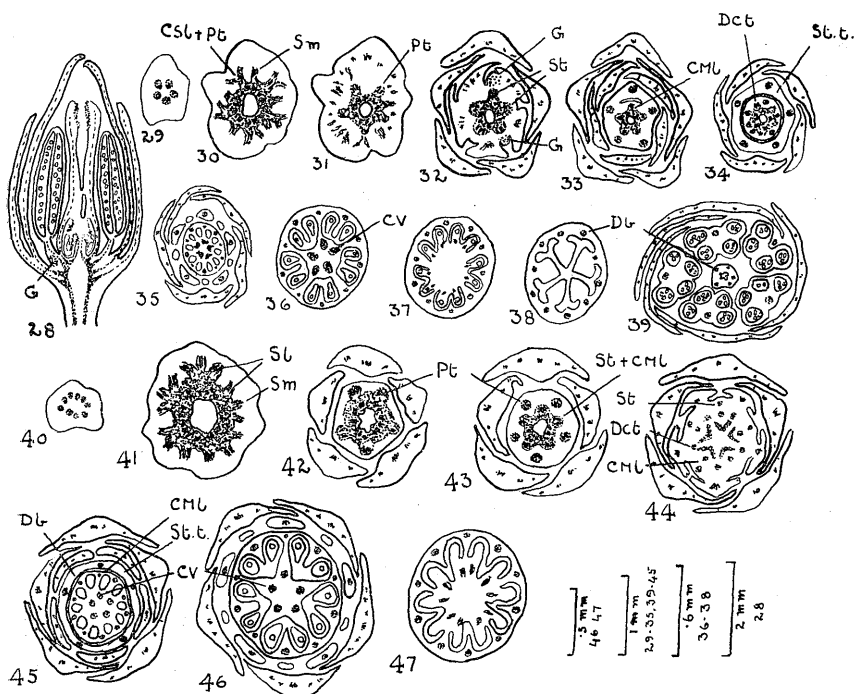
** Continued from Journ. Jap. Bot. 48: 205-208 (1973).

Floral anatomy The stele in the pedicel shows a ring of five bundles (Figs. 2, 16, 29), except in *L. usitatissimum*, where it consists of a ring of discrete bundles (Fig. 13). The stele expands in the receptacle and it becomes a closed ring (Fig. 17). In *Linum flavum* and *L. lewisii* ten traces depart from the central stele, of which five function as sepal midribs and the remaining five as common sepal lateral traces (Figs. 3, 18). The latter undergo radial splitting to demarcate the lateral traces of adjacent sepals (Figs. 4, 5, 19). In *L. usitatissimum* the sepal midrib and lateral traces arise independently from the main stele (Fig. 41). In *L. perenne*, the petal traces arise conjointly with the common sepal lateral traces (Figs. 30, 31). In *L. flavum*, *L. lewisii* and *L. usitatissimum*, the petal traces arise independently (Figs. 5, 19, 42).

After the emergence of the petal traces, the main stele gives off five staminal traces along the sepal radii (Figs. 6, 20, 21, 32, 43).

In *L. flavum* and *L. usitatissimum* there is adnation between the staminal traces and the common median lateral traces (Figs. 7, 8, 44). The common stamen median lateral traces divide tangentially and demarcate the five common median lateral bundles towards the inside (Figs. 8, 44). In *L. lewisii* and *L. perenne* the common median lateral traces arise independently from the main stele (Figs. 22, 23, 33, 34). The five dorsal carpellary traces in *L. flavum* and *L. usitatissimum* arise at the level where the petals separate from the thalamus (Figs. 8, 44). The remaining stele forms five common ventral bundles (Figs. 24, 25, 35, 36, 44, 45). At this level the staminal tube and the ovary separate (Figs. 8, 45). In *Linum lewisii* and *L. perenne*, the five common median lateral traces are followed by five dorsal carpellary traces (Figs. 22, 23, 33, 34). The remaining stele forms five ventral bundles (Figs. 24, 25, 35, 36, 44, 45). In the placental region each common ventral bundle splits into two and these supply the ovules in adjacent loculi (Figs. 11, 12, 26, 27, 36, 37, 46, 47). Only the dorsal carpellary bundles traverse the styles and terminate below the stigmatic lobes (Figs. 1, 14, 15, 28, 39).

Summary and conclusions The quincuncial sepals are three-traced; while there is connation between lateral traces of adjacent sepals in *Linum flavum* and *L. lewisii*, the lateral traces show independent origin in *L. usitatissimum*. The petals are contorted, free and single traced; the



Figs. 1-14. *Linum flavum*. Figs. 15-27. *L. lewisii*. Figs. 28-39. *L. perenne*. Figs. 40-47. *L. usitatissimum*. Figs. 1, 15 and 23. Semidiagrammatic longitudinal sections of flowers showing the course of vascular bundles in the different floral parts.

Figs. 2-14, 16-27 and 29-47. Serial transverse sections of flower buds showing the origin and distribution of vascular traces to the different floral parts. For explanation see text.

Abbreviations. Csl: Common sepal laterals, Csl and Pt: Common sepal laterals and petal traces, Sm: Sepal midrib, Pt: Petal traces, St and CML: Stamen and common median lateral traces, CML: Common median laterals, Cv: Common ventrals, Dct: Dorsal carpellary traces, Db: Dorsal bundles, St. t.: Staminal tube, St. b.: Staminal bundle, G: Gland, Sl: Sepal laterals.

petal traces show independent origin except in *L. perenne*, where they are adnate with common sepal lateral traces. The monadelphous androecium shows five fertile antisepalous, single traced stamens alternating with as many sterile, non-vascularised, antipetalous staminodes except in *L. lewisii* where they are absent. The five carpellary, syncarpous ovary shows two pendulous, anatropous ovules in each loculus. The carpels are 5-traced. The common median lateral traces are adnate with the staminal traces in *Linum flavum* and *L. usitatissimum* while in *L. lewisii* and *L. perenne* they

show independent origin. The placentation is anatomically parietal and the common ventral bundles are completely utilised in ovular supply. In *Linum flavum* and *L. usitatissimum* the styles are free, while there is basal connation in *L. perenne* and connation upon half the length in *L. lewisii*. The dorsal carpellary bundles continue in the style and end below the stigmatic lobes.

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Literature cited

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アマ属の4種; *Linum flavum*, *L. Lewisii*, *L. perenne* および *L. usitatissimum* についての花部の解剖学的研究をした。特に花部諸器官への維管束導入の経路を明かにして、4種の間を述べた。

□應 紹舜 (S.S. Ying): 台湾高山植物彩色図鑑 (Alpine plants of Taiwan in color) Vol. 1, 125 pp. 台北, 国立台湾大学森林系. 1975. US \$ 7.00 (送料共).

第1巻には台湾の高山植物102種のカラー写真が収められ、数枚の台湾の高山と著者の写真もカラーでついている。不鮮明な写真や色のよくでないものがあるのは残念であるが、初めてお目にかかる珍しい種類がカラーで見られるのはうれしい。解説は各種毎に中国語と英語の記載が並記されている。この中にはランの2新種と少数の学名の新組合せがある。*Coeloglossum* 属が台湾で初めて見出されたと記されているが、すでに正宗博士 (1968) が報告されている。巻頭には術語解があり、終りに台湾の高山と高山植物についての概論がある。

(原 寛)